

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

JAN. 15, 1951

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A YEAR

How they measure "Panther-Juice"

The Grumman F9F "Panther"—the first jet-powered carrier plane to strike at an enemy—is one of 10 types of jet aircraft now measuring fuel by the Honeywell Electronic Fuel Indicating System.

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FIRST IN NUMBER



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FOR THE AVIATION INDUSTRY

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NEWS DIGEST

DOMESTIC

Sobel Helicopters Co., Wichita, has been awarded its first F-4 Phantom II order for tactical evaluation of its S-44 helicopter. The purchase will be delayed until FY-74 and will be delivered immediately upon completion of contract negotiations. USAF is buying the commercial version, which has been in production for several months.

Edward M. Smolkin, long-time official of CAA, has resigned. Recently he was director of CAA's project to build another airport at Washington, D. C., and before that was executive assistant to the Administrator. His successor will be Herbert Howell, who has been airport regional director for CAA at Kansas City.

TWA expects to add to speed and payload of its Model 740 and 740A Composites with new jet exhaust fans developed by Lockheed Aircraft Corp. Exhaust collector rings will have been removed of two stages. The rings, which will make the combustion at Kansas City, produce an additional thrust up to operational altitude and 140 to 180 m additional range at cruise payload, or 800 to 1,000 m more payload at cruise range.

New altitude record for lightplanes, claimed by Jerry Wing pilot Carl Bayler, was lighted at the Miami, Fla., air show. Miss Bayler, who weighs just 100 lb., flew a 125-hp Piper Super Cub to 30,588 ft., nearly 4,000 ft. higher than the former record set by Andy Lind Roush, at the Vandenberg Air Force Base, Washington, D. C.

John Forrester Research Center for jet propulsion and related sciences will begin operation at Princeton University within a few months. Faculty for the Center will come from Princeton's mechanical, electrical and mechanical engineering, and mathematics and physics departments.

Earl C. Goss, Washington vice president of Phil & Knowlton, Inc., in charge of public relations for the Aircraft Industries Assn., will move to New York Feb. 1. Succeeding him in Washington is the ALA job will be Avey McKee, now in HAWK vice president in New York. Goss has directed ALA public relations most prominently of the Aeronautical Chamber of Commerce in 1944. McKee, wartime public relations director of the Glenn L. Martin Co., formerly headquartered in N. W. Ave. & 2nd St., is in Honolulu.

Charles M. Bam has been appointed head of CAA's new Bureau of Air Operations. This bureau replaces the old Bureau of Economic Regulation, and enlarges its scope. Bam takes over primary responsibility for economic regulatory activities. Before (the appointment), he was executive officer of CAA's north wing, based in San Francisco.

Aircraft shipments for October came to 1,597,706 lb. airborne weight. The industry got 91 percent of the Civil plane shipments came to 191, worth \$51 million. Engine horsepower shipped totaled 1,589,000, with 98 percent going to the industry.

Fairchild C-47Q Proton has joined at the company's Huntington plant as a result of a strike by production workers. At most were the line of a nine-CRO United Auto Workers Union and 15 others on leave, company officials. The system provides for taking employees' preference for three years to give the base of union. Union wants automatic raises based on seniority.

FINANCIAL

North American Aviation reports net income of \$3,650,235 after taxes for fiscal 1970, ended Sept. 30. Sales and other income rose to \$143,168,418. Net income was \$7,380,469 for the previous fiscal year. Unfilled orders amounted to \$711,344,812 at end of Sept. 30.

National Airlines has voted to pay a 25-cent dividend on its new million shares of outstanding stock, the first cash dividend in the company's 16-year history. It will be payable Jan. 25 to holders of record Jan. 15. National showed a profit of \$338,270 for the fiscal year ended last July 31 and reported earnings after provision for taxes and depreciation of \$497,425 for the five months ended Nov. 10.

INTERNATIONAL

British aircraft industry's exports for November 1970, were \$7,354,432, an against monthly average of \$8,232,400 for 12 previous months. November 30 exports included \$1,981,791 for 57 complete aircraft, \$3,451,746 for 132 engines, \$76,702 for 3732 tires, and \$4,092,207 for accessories. Total was offset by \$2,811,136 of imports, including \$696,158 for 4 aircraft and \$2,721,976 for accessories.

Boeing Aerospace Co. will go into production of the Hercules Hercules to supplement DII's own production. The Ministry of Supply announced.

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Latest production model of GE J47 is installed in USAF planes in J47-23. Unaugmented, it packs 2220 power into the standard J47 basic size. Air Force has not yet released third but has indicated it is in excess

IN THE NEWS

NEW ENGINE NEW TURBO NEW LAB



New turbosupercharger promises longer range, heavier payloads in today's transport aircraft through greater power, lower fuel consumption, and greater efficiency. New on test with Pratt & Whitney R-4340-C engine. It can be adapted to any engine of similar size.

of 3300 pounds. Anti-icing, opposite polarity ignition, and a new compressor having higher efficiency, greater airflow, are main features of -33.

As specialists in every type of aircraft gas turbine, General Electric offers you a complete line of powerful propulsion units: Turbojets, turboprops, turbosuperchargers for piston engines are available to meet your specific needs. Forty-five years of experience are your assurance of quality and dependability.

For aircraft powerplants that keep ahead of the times, call your General Electric aviation specialist or write Apparatus Department, General Electric Company, Schenectady 5, New York.



Full scale compressor test stand in new Aircraft Gas Turbine Laboratory at Lynn, Mass. can run tests including altitudes up to 75,000 feet, temperatures to 1000°. The lab, newly opened, is dedicated to research at Dr. Sanford Moss, chief planner in aviation.

AIRCRAFT GAS TURBINES

GENERAL ELECTRIC

WHO'S WHERE

In the Front Office

L. G. (Barry) Fox, American Airlines' new passenger operations chief at his desk after a three month leave of absence due to illness. **T. L. (Tommy) Reed**, who had served as general director of operations for the system while Fox was out, has been named operations manager.

Thomas M. Miller has been elected vice president of traffic and **W. Thomas Berke** has been elected president of Chicago & Southern Air Lines. Miller was formerly general traffic and sales manager and Berke was personnel director.

Paul J. Farrell has been named a vice president of Fairchild Aircraft to be in charge of operations in the aircraft segment between the company and Ryan-Pacer company, which is part of the C-119 project. During World War II Farrell was assistant general manager of the Fairchild Aircraft division and one of those primarily concerned with the firm's sales and maintenance studies on the C-52 and C-119.

E. M. Edelman has been appointed to the new post of assistant manager of Coast-to-Coast & Rubber Co.'s Aviation Products division.

John Lusk, Pan American World Airways vice president, has returned to his desk after being out almost six months due to illness.

Changes

R. Booth Natchez has joined Robinson Aircraft Inc., Teterboro, N. J., as assistant to the president. He will serve as a liaison representative between the engine and component departments. **Vernon Raskings** has been named factory manager for Oliver L. Martin, replacing **N. E. Vandenberg**, who resigned last 11.

John W. Belonger and **Nicholas M. DeChenne** have been named general managers of General Electric's Large Apparatus and Small Apparatus divisions, respectively. **Willard L. Lander** has been appointed general manager of Fairchild's Aircraft division. **Richard H. Hays** has been named purchasing agent for Aeroquip Corp., Millville, N. J. **Prof. S. Hays, Jr.**, has been named by Solar Aircraft Co. as head of its Division office.

Donald L. Unger has been named manager of operations for American Airlines, succeeding **Harmon Thielig** who resigned to join a third agency as an executive consultant. **Capt. James R. Miller** has been made wing operations manager for Pan American World Airways Atlantic division.

Honors and Elections

New officers elected by the Aeronautical Engineering Society for 1951 include: **C. H. Blanche** (TWA) president; **C. G. Adams** (Boeing) first vice president; and **R. G. Lockard** (Cessna) second vice president.

INDUSTRY OBSERVER

Electronic and aircraft manufacturers have been handed a packaged requirements suggested by the USAF to produce a fully automatic, semi-automated, and semi-manual, designed to knock down an enemy bomber at 50,000 ft. altitude. Hughes Aircraft has won the competition for the electronic guidance. The airplane competition is as yet undecided, with several of the major companies competing.

Only orders for Douglas A-1D target attack fighters are expected to be in such quantities as to absorb most of the production of the Allison T-40 and the Pratt & Whitney T-34 turboprop engines for the next two years.

Pratt & Whitney is expected to replace its de Havilland Gyron, now in use, with the French built Turbomeca 450 Gyron engine, which is to go into service. First production Gyron first test No. 10, a completely new version, the 452 Gyron is being built by Fiat for flight at later. Gyron is to be powered with the British Rover-Knight New turboprop.

Goodrich Aircraft is conducting a flight test program with its GA-22 four-place amphibian (Aeronautics Week Nov. 6) to demonstrate that it will pass all FAA requirements for certification. As soon as this is completed about May 1, the prototype is scheduled to be demonstrated to the Department of Defense as to its capabilities for liaison and reconnaissance work. Goodrich is looking for manufacturers interested in production of the plane if defense orders are forthcoming.

Aero Canada Ltd. is conducting a series of test-flight and performance tests on the Aero Jetstream. It expects the first pre-production model of the two-seat CF-100 fighter, powered with Aero-built Orenda turbojets, to be flying soon. The two prototype CF-100s have already made more than 150 test flights. Assembly line for the eight fighters is now being set up.

Use of virtually standard turbojet aircraft engines to power some of the guided missiles now being studied for production means that some of the engine manufacturers are awarded a new market for their products no matter how late the production wings from aircraft to missiles for defense. Best example is the Allison J-33 engine which powers the Martin Mystere.

Lightplane manufacturers who are still producing civilian planes, principally Cessna, Piper, Beech and Ryan, are experiencing a belated demand from customers, such as hasn't been seen since the private flying boom days of 1946. And if delays in deliveries of parts and components haven't slowed materially less, the 1950 plane deliveries might have been considerably higher than the 1400 aircraft at which they are looking out.

Cessna Aircraft plans for after the war emergency future a new model two-seater. It will take the place of the popular Model 140, being discontinued Feb. 15. Cessna has a contract for approximately 1000 L-19 liaison planes for Air Force and Army use. It also is constructing parts for the Boeing B-47 and Lockheed F-94, and continues limited production of its four- and five-place civilian models.

Interesting byproduct of the development of big cargo transports such as the Douglas C-124A Globemaster II has been the design of new tie-down fittings with rated strengths as high as 30,000 lb., in both heavy chains and shackles. New methods of lashing vehicles in place for air transportation make it possible to provide restraint for a 300,000-lb. or 1,500-tonward, all, or to one side, even for a single large 30,000-lb. vehicle or package.

Abolish CAB?

The Civil Aeronautics Board may have its fight for its life in the years of Congress.

Edward Johnson, chief director of the Subcommittee on Domestic Surface Transportation of the Senate Interstate and Foreign Commerce Committee, is now drafting legislation repealing the 1940 Transportation Act. It will be introduced by the committee's chairman, Sen. Edward Johnson, and likely will require a substantial legislative compromise. This would absorb Interstate Commerce Commission and take over interstate and air commerce regulatory functions.

It will also probably make those proposals afloat again.

- **Minimum and maximum rates**, instead of fixed rates. The maximum would protect shippers and passengers from monopolistic overcharging; the minimum would prevent the "bumping out" of competition. Within this range competition would work.
- **Control of all schedules**, direct and indirect, by the United States Civil Aeronautics Administration. It would give an opportunity for airway facilities, as well as support to the airlines.
- **Certificates of "solvency and commerciality"** issued by the new NTCA would take into account all types of resources available to a company—bus, automobile, truck, rail, airline.

New CAB Member?

Stations work down hostile stations. Joseph Adams, former Director of Aeronautics by Washington state, is the new CAB member. He's the candidate of Sen. Warren Magnuson has gained western backing. Fairly, Adams disavowed a Monroe as long as Krumm as the last year held the rank of colonel.

Sen. Harley Kilgus won't fight the appointment although Kilgus pushed for reappointment of Russell Adams, now an assistant to the Secretary of State. At the time, he charged Powell's efforts to "kill off" Russell Adams for his opposition to the PAA American Overseas strategy.

Congressional leaders (though, don't recall Russell Adams shift to PAA, but rather to the President's decision to open the case for Joseph Adams. Magnuson has proposed, now assistant Joseph Adams' appointment and been named down when Thomas selected Joseph O'Connell for appointment, instead. Adams' departure could also give the Fair West more representation on the Board. Several aviation sources are pressing for this.

Air Cargo: USAF Stepchild

As it was in the last war it is reportedly going to be in this campaign. USAF's Service Officers Board has modeled out of its development program a phase designed for MATS operations and feasible for contract operations to increase activity in later. This depicts MATS commander, Maj. Gen. Cassius K. K. (a) as a plan, and congressional apprehensions that lack of an agency to carry on war thousands of miles from shore.

Chief of Staff Gen. Hoyt Vandenberg stated a bulk up of air to "desirable—not essential."

War Peak Capacity

Capacity for 50,000 planes a year, added by President Truman, will actually mean an individual line expansion that of the past, say, 1944, when 50,000 aircraft filled all production lines. This line will produce less than one because four times the effort of 50,000 goes into today's heavier, more complicated craft. The weight of 50,000 planes in 1944 was 905 million lb., 50,000 now would weigh about 670 million lb.

New Renegotiation Law

A new renegotiation law will be one of the first orders of business of the House Ways and Means Committee. The proposed Renegotiation Act will be expanded to virtually all government contracts. This would mean coverage, for the first time, for National Aeronautics Administration contracts and contracts of the Civil Aeronautics Administration. Previous law under the 1951 fiscal year military budget applies only to Department of Defense contracts.

International Air Subsidies

Sen. Edwin Johnson, chairman of the Senate Interstate and Foreign Commerce Committee, is concerned that operations of airlines may pay from government support in U. S. companies' international routes now being out of "aid" government-subsidized competition from foreign carriers.

But the Senate has decided his committee to wait, not a plan for assistance over international, as well as domestic, routes. He plans to introduce legislation accomplishing this shortly.

Here and There

- **Contact negotiations**. A shortage of trained negotiators in USAF and Naval Air is holding back contact negotiations.
- **Airline: Air Force will wait it, but the general impression** is that it is a national emergency if it's not the class of lawyer and can be deferred.
- **Civil defense**. Air Coordinating Committee's chairman, Dean Rusk, and Civil Defense Administrator Wilfred Gilchrist are working out air transportation for civil defense. There are now 50,000 men on the plane that might turn out with National Association of State Aeronautics Officials has set the wheels rolling for nonmembers at the state level and down the "you soon" applying its membership with a model organization.
- **Air Engineering Development Center**. The high altitude engine test chamber, constructed from captured German equipment, will be ready early in 1952. The instrument will be used in the engine, the engine's performance will be ready early in 1952.
- **Engineer**. Key Mr. Walter Norblad is pending Chairman Carl Vroomer is open hearings before the House Armed Services Committee. He wants tactics are transferred from USAF to the Army. Vroomer wants the service to work the matter out themselves—without public fanfare.



B-36 CONTRACTS placed in USAF are expected to keep the North American production line rolling for a long time to come.

Orders Roll: AF Issues \$4.5 Billion Worth

Eight air frame, four engine, two propeller companies get bulk of fiscal 1951 business.

By Aviation Week's
Washington Staff

The USAF procurement loggers a broken air report.

Top Pentagon sources have told Aviation Week that virtually the entire \$4.5 billion so far appropriated for fiscal year 1951 had been procured. It has been recommended in letters of intent as of Jan. 5.

Actual contracts have been issued obligating \$4.5 billion of that total.

Disbursing of the Air Force procurement block, coming at an all night session of the Service Officers Board, immediately following the enactment of the second appropriation for the 1951 fiscal year (Aviation Week Jan. 8).

Reg. Gen. Hiram A. Stewart, Assistant to Deputy Chief of Staff, USAF, Materiel, was personally dispatched to ANSC headquarters, Wright Patterson AFB, Dayton, O., with the program of commitment and obligation. The actual paper work of the program was handled there.

Indications are that additional ap-

proportionate appropriations within the next two months will be taken as by Congress to the program as it now stands. This is a means of making the funds continuously available. If the forthcoming appropriations are for the fiscal 1952 (year they would not be available until July 1, 1951).

Eight airplane manufacturers share the bulk of the airplane contracts. Three engine companies divide the engine contracts with a fourth coming in for a lesser share.

Here are the airplane companies and the products they are expected to supply to USAF:

- **Boeing Airplane Co.**, B-47C, B-47D and B-50D bombers and C-97 transports.
- **Douglas Aircraft Co.**, C-124 and C-119 transports.

USAF 1951 Procurement Status

Status of USAF fiscal 1951 funds committed and obligated by Air Materiel Command as of Jan. 5 is shown in table prepared especially for Aviation Week.

Major Categories	Amount Committed	Amount Obligated
Amount and related procurement	\$4,945,919,588	\$5,609,725,761
Materiel procurement other than aircraft	602,462,394	795,141,963
Maintenance and operation	954,568,994	951,547,054
Research and development	179,093,514	73,541,112
Total	\$6,682,046,480	\$7,428,262,969

Committed funds are those that have been awarded to a specific procurement. Funds are obligated when a contractual document is issued.

• **Lockheed Aircraft Corp.**, F-40 fighter, T-33 trainer, and G-123G transport

• **North American Aviation**, F-86F fighter, T-25 trainer

• **Northrop Aircraft**, F-40 night fighter

• **Republic Aviation**, F-84E and F-84F fighter

• **Consolidated Vultee**, B-30F bomber and T-25 trainer

• **Fairchild Aircraft**, C-119B transport

Here are the engine companies and the principal subcontractors they are expected to supply:

• **Pratt & Whitney Aircraft**, B-4500 Wing Major, the B-7800, and the J-45 jet engine

• **Allison Division**, General Motors Corp., J-35 and J-37 jet engines

• **General Electric Corp.**, F-47 jet engine

• **Curtis-Wright Corp.**, R-1300 and R-6150 piston engines, and possibly the Stinson jet engine

Curtis-Wright Corp. and Allison are the main suppliers of General Motors' share of the 30th of the Air Force's jet engine business, it is indicated.

• **Avionics**—The vast amount of equipment going for electronic, electric and radar equipment is shown by the long list of potential Air Force contractors who fall in the category. Sperry Corp., Lear, Inc., Minneapolis Honeywell, Bendix Aviation, Hughes Aircraft, RCA, Philco, Western Electric, General Electric, Resonance Electric, General Mills, Collins Radio, Raytheon and Radio Shack.

Other miscellaneous principal contractors are: A. C. Sparkplug, Eastern Kolls and A. C. Smith Corp.

• **\$5,000 Plant**—Air Force Administrator John A. McCone last week said that the Air Force construction at ANTC headquarters here, by only a few days, President Truman's message calling for procurement to expand the U.S. aircraft industry to a capacity of 50,000 airplanes a year.

Soon after, McCone indicated that the additional capacity will be in demand as it is steadily produced about 3000 planes a month by mid-1952. But, McCone said, the program calls for plants to be operating and loaded up so that by opening standards assembly lines and peeling workers on an around-the-clock schedule the output can, at least theoretically, be virtually doubled in an emergency.

President Truman cited comparative cost of B-36 bombers at \$17.75 per hour of World War II, at \$9.3 million each for the B-36 as against a price of \$27.1 thousand each for the B-17.

McCone declared that President Truman's previous goal of a fivefold aircraft production capacity in a year was not unrealistic and could be reached easily.



Long-Range F-84F Strikes With Guns, Bombs, Rockets

Latest version of the Thunderjet, Republic's sweeping F-84F, will bring greater speed and firepower to the plane's fighter-bomber role. No specific data on the F's potential are yet available. But following the Phase Two flight tests recently completed at Edwards AFB, Mosby, Calif., word went out that the sweeping F-84F can perform as a predator, the E, in every category.

This information is significant in that the F's reported speed is 670 mph, its maximum range is 3,100 miles in 32.5 to 35 minutes at 12,000 ft. Yet Time plus 12.5 min. indicates.

The accompanying photos show some of the testing schemes of the sweeping F-84F, in addition to the plane's final armament of 6.10 in. guns. A briefing held at 24.5 in. indicates a test in photo above. Shown below is a combination of 18 rockets and 2 1000-lb. bombs. Two 250-gal. external fuel tanks can be carried on the pylons mounted on the wings. Top photo, composite page, depicts the F-84F in behind an apple box of 5-wheeled. An illustration on opposite page in the F as an escort fighter carrying 2 150-gal. tanks under the wings, to give it a series of when exceeding that in its production. Figure for the F-84F with four external tanks (two under tips, two on boom pylons) will show 1800 mi. Report is that the F has been ordered in large quantities. It is likely that the production version will have a modified fuselage.



Share Air Contracts

Mobilization of major segments of the aerospace industry along with several smaller industries continues to make news this week as the Air Force and Navy move to augment the nation's aircraft production potential.

• **Chrysler Corp.**, Detroit. Negotiations are underway between Pratt & Whitney Aircraft and United Aircraft Corp. and the Chrysler Corp. for license to manufacture J-45 Turbo-Wasp jet engines at Detroit. Chrysler will build a new plant near that city for manufacture of the G5500 thrust J-45.

• **Sears, Inc.**, Evanston, Ind. Under terms of a preliminary letter of intent contract agreement between Republic Aviation Corp. and Sears, the gas refrigeration company will build F-24 Thunderlight night wings. During World War II Sears built parts, including aircraft gun turret sub-assemblies and engine engine cylinder heads. Peak employment reached during World War II was 10,000.

• **General Electric**, USAF has entered negotiations with GE for construction of aircraft superchargers at the old Alcoa Chatham supercharger plant at West Alton, Wis. The plant is now occupied by Holston Manufacturing Co., a GE subsidiary manufacturing turbosuperchargers.

• **Bell Aircraft**, Bell will build B-36 and B-47 jet engine "podings" for the Convair and Boeing at the Bell Aircraft Corp. plant in Fort Worth. The B-36 and B-47 jet engines 115 each. Bell will occupy the plant as soon as General Services Administration can remove stand equipment. The plant is under Navy ownership.

• **Lockheed Aircraft Corp.**, An aircraft work conference in early November. Work story that Lockheed would receive a portion of the former Bell Aircraft Co. plant for modification of B-36 aircraft. More portions of the facility will be held for production of an "as yet unnamed heavy bomber." This action decision as to retention of present B-36 has not been reached. Air Force at present is still considering a replacement proposal of the B-36 against a heavier version of the Boeing B-47. Boeing's heavy bomber contract is the B-52 scheduled for roll out late this year.

• **General Motors**, GMC this week formed an earlier than (November Work Dec. 25) that it would build the Republic P-84F under license at its Kansas City facility. GMC announced Edward D. Rollins as manager of its aircraft program at Kansas City and said that its management group would set up headquarters there Feb. 1.

Lightplane Year

1950 closes strong but producers worry about priorities situation.

Cross Aircraft Co. lost leadership in 1950 lightplane production, but a slight margin over Piper Aircraft, first aircraft for the two companies showed last week.

Incomplete returns for all companies, revealed by Aircraft Industries Association, showed 1950 shipments of 14,715 planes, with manufacturers' value of more than \$15.5 million. This is substantially ahead of 1949 sales of 13,621 planes valued at \$14,514,480.

Cross shipped 1154 planes and Piper 1108, so that the two companies together produced approximately two-thirds of all the planes shipped.

Joseph T. Gearing, Jr., AIA Personal Aircraft Council chairman, points out that in addition to the cross production, virtually all the personal aircraft manufacturers are already working on substitutes for military planes. Some are producing liaison planes and conducting modification programs on other military planes.

The sharp increase in dollar volume for 1950 reflects the trend toward larger and more expensive planes for executive travel and business use. The increase was seen in a definite turning point in the postwar history of the light plane companies which had watched sales drop each year since the boom year of 1946.

Sales in the last quarter of 1950 exceeded each month, in contrast to the most seasonal winter decline in small plane sales. This was attributed as well to the increased business use of the planes and probably also to large increases in the military demand created by anticipated shortages in plane supplies in 1951.

Production Needs-CIA is expected to make a presentation to the National Production Authority next week on what priorities should be allotted for smaller aircraft. It is not expected that forthcoming priorities will be sufficient to produce at a rate of more than approximately 3600 planes a year, perhaps considerably less.

Representatives of CAA as the need for priorities will be based primarily on the uses of the planes by industry—a recent CAA study shows that a total of 480,016 planes are now being used by industries where they are vital. Use of the planes in agriculture for spraying, dusting, seeding, and fertilizing, and hauling farm produce and equipment, is emphasized. CAA records show that 16,380 planes are operated by farmers and ranches. Able to be converted

will be the need for conversion of training programs and plans to provide a continuing reservoir of young pilots to replenish the aging World War II pilot reserve.

A study recently made by AIA showed that the materials needed by the personal plane companies to produce in the 1949 level of approximately 11,000 planes was as small as in the worst supplies in an overall materials requirements program. Yet if these supplies are not provided, planes now in use in business and agriculture will be grounded for want of spare parts materials. The small but useful lightplane industry will deteriorate and go under.

The AIA study showed that for 1949 the non-transport aircraft industry used 1,337 tons of steel, 3,666 tons of aluminum, 177 tons of copper and 91 tons of rubber. This compares with total production by the U.S. of 77, 974,176 tons of steel, 603,462 tons of aluminum, 1,672,000 tons of copper and 1,211,532 tons of rubber. The non-transport plane builders would need only a quarter of one percent of the aluminum supply and even less of all the other materials.

Full Steam Up on Flush-Deck Carrier

Navy's plan for a new 60,000-ton flush-deck carrier, slightly smaller than the all-steel aircraft carrier, United States, received final speed ahead last week in Congress.

Rep Carl Vinson, head of the House Armed Services Committee, introduced a bill calling for such a vessel, which he called the White Horse approach. [Carrier United States never got beyond the last-living stage when the war was ended as its capacity more than the Secretary of Defense Louis Howe (now chairman of the White House approach) but times have changed.

The new carrier will probably be named James V. Forrestal, after the first Secretary of Defense. The name has been approved by Rep. Jack Anderson, member of Vinson's committee, and Vinson and other committee members have endorsed it.

Main purpose of the larger carrier, whose construction is to take approximately twice as much tonnage, is to carry bigger and heavier carrier planes with longer range. They cannot be accommodated now, for landings at least, on the largest U.S. carrier carriers in service.

It is expected to be a high-speed outfit, as surface vessels go, with a number of modifications developed by Navy Bureau of Ships plus the Mallory class was built and since the United States design was scrapped.

Russian Planes

First close-up photos snipped from newspaper captured in Korea.

The first official close-up photos of Russian military aircraft seen in these parts since the end of the war last year were released by the Department of Defense.

Features are still from a Russian propaganda newspaper which was captured in North Korea, and include the first photo of a new jet fighter, the Su-15, in the MIG-15, credited to Sergeant A. Lavochkin (top photo, p. 17).

■ **Newest Jet—**Designated Lavochkin's name has been conspicuously missing from the lists of Russia's recent aircraft. He has been apparently working on jet designs, and in fact, has been listed as the designer of a new, high-speed, night-fighting version of the German Messerschmitt 109. But a press release and House of Soviet Labor is expected to confirm existence, and that it is possible that Lavochkin has finally come through.

This fighter and the MIG-15 (American News Nov. 13, 1950 and Jan. 1, 1951) have made in common. Recognized differences would include the higher mounted wing of the Lavochkin and the turning on the under side of its landing. Incidentally, the first thought on seeing this fighter is that it resembles a modified MIG. But a closer glance shows that the landing is better suited, and that it probably never entered a jet bomber.

Another item of interest is the German design influence, which is very apparent in the picture of the La, with its vast wing of nearly constant chord and its high jet tail.

The bridge, of stability and control cross-section, was its most likely to be the Russian design of its engine, or even of the engine, which now bears the name of Russian engine-designer Chelavsky.

■ **No Strange Breakdowns—**The long line of new transport-type carriers with their own wings up of 14 Douglas B-26, (second photo from top, p. 17). Another's standard modernization aircraft (American News Jan. 21, 1951).

The 124 ft span plane is powered by two 480-hp engines which develop 1775 hp, each. Naval service capacity is listed as crew of 5 or 4 for military purposes (with one crew is 5, including structural) plus 25-32 passengers. The body is fixed (open down the crew) serve to be wearing parachute gear, and more than aren't 32 of these, it is a reasonable assumption that the difference in the B-26 carrying capacity is made up of weapons for these men.

Signs of the La is the designer of this craft, which is in service as the Polish and Czechoslovakian air forces, as well as in Russia. It was seen in a flying ring at the Yalovka air field in 1946.

■ **Out of Berlin—**The Tu-4 is a very familiar face. It is a direct copy of, and in most details identical to Boeing's B-29. The ground photo only seems to confirm the impression that the Russians had copied every rivet and bolt (second photo from bottom).

But don't mistake Andrei Trepinin's accomplishment. Taking a few B-29s and disassembling them isn't big, but in order to be able to build some more, it's quite a feat. And the production knowledge gained during the process would not be unaccountable, either. This airplane is becoming the stored and ready member of the Red Air Force and it will be some time before its performance is matched or made obsolete by more recent jet designs.

■ **Russia's First Jet—**The Yak-15 shown here in what appears to be standard service was Russia's first jet aircraft. It was a wartime marriage of a proven fighter airframe (the Yak-1 through 9 series before war, first built in 1943) and a captured German jet engine (Jumo 004) and flow jet engine. Alchabur's 5 Yakovlev, gets the design credit for this new (bottom photo).

Judging from photos, all of the Yak's available features were kept with the exception of the powerplant section ahead of the fuselage and a small section of the fuselage belly. The 004 engine was fitted along with some kind of engine mount, possibly picking up the original structural points in the fuselage. As noted in the complete possible—a metal hole just upstream of the engine inlet is under the fuselage. It suggests that the plane that a section of the fuselage has been removed to substitute the jet blast.

Dimensions are probably the same as those of the Yak-9 post-warage army 30m, 32 ft 10 in. length, 29 ft. The combination of engine structure and shock-absorbing engine should have a top speed not much greater than the top of the piston Yak series. The 9, which is a 1500-hp engine, developed a top speed of about 470 mph. On a good day, the Yak 15 might exceed that figure to 570 mph, but no more.



'50 Profits Rested on Solid Base

But recent entry of auto firms into aircraft picture dims otherwise bright prospects for high 1951 returns.

The sharp increase in backlog and the prospects of additional business to come has led a tendency to overshadow the solid accomplishments of the aircraft builders during 1950.

Aircraft sales in 1950 were the peak in a decade, with 1949 second. But to the untrained, the expansion may be that such deliveries and earnings are a direct consequence of recent events and nothing but progressive multiple increases can be expected from now on.

For 1950, dollar sales of the 15 large aircraft units is estimated at about \$13 billion. This compares with some \$13 billion for the comparable 1949 period. The bulk of these sales represented military aircraft. But in a few cases, commercial deliveries represented an important segment of the total volume.

All Major Profits.—All major aircraft companies are known to have shown operating profits last year. This is the first time this industry-wide accomplishment was recorded since 1945.

It is difficult to estimate the aggregate of industry profits for 1950 at this time due to the many qualifications demanded to construct precise individualization and the recognition processes (even when earnings are reported, they will have a tentative size until negotiations for the periods involved are completed).

Using current average profit margin equities of 3 to 34 percent after taxes, 1950 net profits are also known to be about \$60 to \$75 million. This would compare with a total of more than \$45 million shown for 1949. The industry's consistent progress becomes evident when it is realized that total profits in 1949 amounted to \$16.6 million on sales of about \$1.2 billion.

The average profit margin experience will vary widely for the separate aircraft companies, depending on individual efficiency factors and types of production. For example, Lockheed had important deliveries of its Constellation aircraft to commercial sources during 1950. With the original development and engineering costs partially amortized on this type airplane, current deliveries have a tendency to take higher profit margins than available through military bookings.

Selective Pattern-A.—A few aircraft units on the other hand have only recently completed the liquidation of their postwar losses resulting from unfortunate ventures. For instance, for its first year ended July 31, 1950, Northrop Aircraft, Inc., showed a net operating profit of \$2,481,426. But \$5,500,000 was provided to liquidate the loss on the fixed-price contract covering the production of C-125. After adjustment, this loss was reduced to \$1,058,990 and written off during the past fiscal year, leaving the company with a net loss of \$44,974.

Northrop remains indebted to the Reconstruction Finance Corp. for loans previously obtained to help it through recent difficulties. As of July 31, 1950, this total debt amounted to \$5,725,000. It is significant that until the RFC debt is liquidated, compensation payable to certain principal officers is limited, and can dividends be paid on the capital stock without the agency's consent. The known accounts accelerated the flow of additional orders to Northrop and the company is now in a much better position to stabilize its finances.

The same selective pattern of production and earnings will prevail in the future. These trends will be strongly influenced by the early introduction of new wartime contracts in the manufacturing process. This is particularly true of the automobile industry in showing production of key aircraft types and components with the air industry. This will tend to hold down volume and earnings of the prime builders.

Auto Makers Enter.—The military have indicated a strong desire to provide at least two sources of supply for each vital aircraft type, depending on production rates at the time. This has given the automobile group a potent opening wedge and the trend in this direction may be expected to continue.

Kearfott, heavily in debt to the RFC, was aided by that agency in obtaining the franchise to build Fairchild C-119 Packets at Willow Run. It is known that Packard was awarded to build additional C-119s at any one of a number of named plants throughout the country. What the company will probably be asked of selected production at its main plant in Highstown, Md., its total overall expansion

to deliver an increasing number of Packets needed will be limited. Of some significance is the fact that its profits will be under a ceiling, with a second source of supply under similar company's production. Packard will collect first for airplanes in delivering engineering and production there to Kaiser-Frazer but such income will fall far short of the earnings it could generate if this production remained completely under its wing.

Subcontracting.—Hydraulic aircraft companies who have followed an extensive subcontracting practice should do much better profitably. For example, Grumman Lockheed and Boeing are known to have suggested that production potentialities for contractors be emphasized in the subcontracting principle. In this manner, the prime contractor places itself in a position to accelerate its production levels. It usually assumes the responsibility of the price contractor in delivery of the required work either by subcontract or doing it directly at the lowest cost.

The subcontracting practice seems to be a safe value in avoiding sharp reductions in plant expenses and employment with subsequent defalcation equipment. Nevertheless, the utilization of extensive subcontracting is no guarantee that a prime aircraft builder can prevent his product from being accepted for complete manufacture by another company.

As previous contracts are being completed, there may be a tendency for deliveries and earnings during the early periods of this year to show relative decline. This condition will apply to Boeing, for example, which is again winding up completion of its B-47 orders. Volume will not start up again until the B-47s are in accelerated production.

It is this type of performance which may confuse those who fully accept President Truman's estimate of a five-fold increase in aircraft production within one year to be fulfilled. The industry believes a five-fold expansion during the next twelve months is about the best that can now be expected under favorable conditions.

It is a net average that with efficient management practices, earnings will have a tendency to mount as a direct result to the volume of aircraft production delivered.

The present average profits for earnings, which represent a top ceiling of 32 percent, are considered narrow and income profits taxes, at no one exists to earnings. Net profit margins ranging from 3 to 4 percent, after all tax impacts, are quite possible for a number of key aircraft companies. This condition should enable permit a further increase in the overall industry earnings for 1951.

—Rolf Albrecht

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NIGHT flight. Oxygen went below...



FIRING, which results in new record...

Viking Flights Prove Research Worth

Martin-built test vehicle, designed to investigate upper atmosphere, completes six successful launchings.

Viking Six, one of the slow research rockets built by the Glenn L. Martin Co., passed off the firing table at White Sands Proving Ground and into the blackness of the night of Dec. 31, 1959.

For 45 sec. the rocket blasted through the sky and then, just as it had reached a speed of about 4,000 ft., it quieted so accurately that staff all

Normally, this is an cause for rejoicing. With Viking Six there must have been little disappointment when the scientists later read the records. They showed that of the power had shined on for 30 sec. more, a new altitude mark of 175 miles would have been set.

But there was not a vapor rising to the dark cloud, after all. The night firing was likewise successful, and the rocket ran well on its way toward a second. And more important, these Vikings in a row had been fired with equal success. Considering that the Germans pegged off about 200 V-2s (and an unknown number of a mile more), the AS developed to test stability and control) before they got a successful flight, the Viking achievement is outstanding.

First Night—This, the first night flight Viking made, was flown by the Navy and in the advantage of a wintered shorter—don't ask how. The rocket was introduced primarily to

measure atmospheric temperature, pressure and density. Secondary data were obtained for flight path, velocities and rocket angle, water performance, base pressure, down and tail section temperatures to flight.

This means like quite a slug of information to get from just one rocket firing. That's true enough—but the fact has been amplified somewhat because Viking, unlike the warhead V-2, was specifically designed for the job of scientific research. In 1946 the Naval Research Laboratory, established a general specification for a high altitude sounding rocket. The spec was out of two needs:

• **Atmospheric data were needed for higher altitudes than the V-2 could achieve** (174 mi. up in its domestic record).

• **Landed numbers of V-2 rockets were variable and no more were to be built.** The spec—and the contract with Martin which followed—was a model of looseness. It is a tribute to any research outfit—and especially to a Navy one—that they were able to appreciate that the job could not be defined on a set-and-dred basis.

• **Variable Payload—Specifically, the NRL spec said that a vehicle should be built to carry a payload of from 100 to 1000 lb. to altitudes of over 100 mi. in an orbital fashion.** And then the problem was one of designing a rocket

vehicle to gather data which would be used as design, if the contract was written on a fire-and-for-burn. This meant that any changes indicated by the flight of a given model would be back into the next model.

So Viking was built. But it was first named Negative and designated HARS-2 (for High-Altitude Sounding Rocket). Stashed in one of camouflage in the winter field later changed the designation to KTV-12 and finally to KTV-N-12 (for Research Test Vehicle—Navy-12). Meanwhile, the name Negative was dropped to avoid confusion with the airplane of the same name. After a brief period, during which Martin personnel called it Mica, the rocket finally took its name, looking to Viking.

• **Rocket-Propelled**—Basically, the Viking can be described by saying that it is a rocket-propelled research vehicle which looks like most other rockets. It is 11 ft. (just under 10 ft.) and has (72 in. diameter) and has four fins. The motor (Reaction Motors, Inc. XLR-10-BM-1) 20,000 lb. thrust in its full section and the instruments are up front. Between there is a slew of odd and tall tubes.

Viking (and any other rocket) is generally described during at the nose, which houses the top where the major instruments are to be fired.

(A) White Sands Proving Ground rockets are fired up to five north. They are designated by the name of the compass direction to which they point, and the number is divided into four quadrants between these directions. In

light, pitch movements are achieved by a north-south plane and yaw to an east-west plane.

• **Quadruple Reaction—Viking is a double function, by its two functions:** • **Instrumentation**, in the top 75 in. of the body. This compartment is clad in stainless steel and is sealed against pressure leakage.

• **Control**, in a bay just below the instrumentation. Batteries, power supply, gyro, position boxes and amplifiers are in this aluminum-clad section.

• **Pressurizing system**, in the next section down. Here are housed the nitrogen supply valves and regulators. Here also are the handbooks—small controlled streams of gas which provide lateral thrusts to control the rocket in pitch and yaw.

• **Propellant tanks**. Liquid oxygen in the motor and in the upper tank. In the first two Vikings, this was a separate section, but in the third and subsequent, it is an integral tank. Ethyl alcohol—100 gal. of 80 in the tank in the lower tank. In the center of this tank is a constant which leads the liquid oxygen—oxygen, or less, for short—through to the engine.

• **Tail section**, which contains most of the power plant. The upper and lower two propellant pumps which are driven by a turbine. The turbine is turned by a power plant driven by the de-composition of a hydrogen peroxide. The tail fin provides it in the form of a locked and surrounding the pump and turbine. Continues to the rear of the rocket fins up with the rocket thrust axis.

The rocket engine is pushed around and moved by a hydraulic controlled hydraulic system to turn the rocket while power is on.

Four are arranged around sections with wedge holding and turning edges. But when the rocket is on the ground and out of each fin to correct for the misalignment of that fin. Leading edge and tip section of the fin are stainless steel, because of the high temperature resistance of these sections.

Cables and tubing run through the propellant tanks in the first two rounds, but in the third round there were no cables, no cables, no cables.

Pitch and yaw control of the Viking during powered flight is handled by means of the thrust axis. Roll control comes from fins on the east and west fins, interconnected with constant motors (Boson Motors) (the power source). The tilt and stress discharge provide the necessary effort moment to roll the rocket.

After post-flight cutoff, control and steering comes to the blackboard. Yaw and pitch are in the post-flight control room. The yaw and pitch are in the post-flight control room. The yaw and pitch are in the post-flight control room.



VIKING SIX, for jet launchers, test-bed for development of interlocking...

• **Ground Cam-In** addition to the built-in equipment, there is a camera of ground observation mounted on the launch. (A 3.5 in. camera, the Cam-In was built to adapt to less than 12 different cameras for their field lenses with the V-2.)

• **Fire Viking**, most of the modifications are portable and out part of the Flying Ground. This auxiliary equipment includes:

• **Transport cart**, for moving the rocket between ground points. This is usually a simple structure with a tank, the latter doubling as a lifting lift for the rocket section.

• **Work stands**. These are specially built for each major section of the Viking, and are used during preflight inspection and work in the larger launch area. Each stand has electrical power and sleep air outlets.

• **Test boxes**, for preflight proving of systems and components. These include such things as gyro checkers and timing sequence circuit checkers.

• **Firing table** for holding the rocket before launch. This is a simple welded steel structure which can be tilted to any launch angle up to 45 degrees.

• **Replacement structure for the rocket**. During static firing which occurs flights the entire structure of the rocket and some adjacent area is removed for work and observation. A special structure has been built to replace the fin during these operations.

• **Portable launch rail**. This is a vehicle which contains a set of one or more sections of adjustments and other controls useful to the rocket both in the launch and at the firing site. An additional set of work centers on structural part of these cars at the firing site—on the blackboard, and on the launch area.

• **Control test panel**. This panel provides motor reading and operation of



BLACKBOARD with instruments, controls and launchers in firing area control...

the control system from the blackboard.

• **Firing deck**. Here is really the heart of Viking operations because this deck contains the sequence control for starting and stopping the preflight and the necessary instrumentation.

• **Gas changes** for high pressure delivery of gas. Nitrogen or any other gas generally comes commercially in cylinders at about 2000 psi pressure. Some Viking pressure sphere requires nitrogen at about 4000 psi, a separate venting system is necessary.

• **Hydraulic power supply**. This is a commercial item which has been reworked to run at demand flows of about 12 gpm up to 1500 psi pressure.

• **Servicing connection**, for preflight flow control during tanking. These are designed to handle the flow of each particular propellant from transporting carts to the rocket.

• **Four large developed launching of Viking**. For launching table and a different firing table were supplied.

And in addition to all this specialized equipment, there is much more at WSPG. Chained by Viking for V-2 projects and other research firing groups. These would all use the same motor, the blackboard and the launching site and so on.

• **Take Time—Some** view of the complexity of operations with this is an other rocket can be gained by the track of Viking One's time schedule. It could be remembered that this was to be the first of American ground in the V-2 that it was a costly venture, that there was a great deal of work required, a machine could be not only expensive but dangerous.

• **Fourth Viking** Viking operations in the blackboard and launch. These are provided by a preparation period and followed by a support and cleanup. Preparation period length depends on

the NRI, experimental schedule and the number of changes to be made by Matco. It has been as long as a period as 15 weeks, and as short as three, the smaller figure being the one for the standard design.

Repeat and cleanup runs from one to five weeks.

Horizontal operations include assessing superheat at WSFG, couple test, spread configurations and change functional tests, radar interference tests and firing arcs and trailer preparations.

Naturally, this part of the routine takes 14 days.

Vertical operations include all pre-flight tests and clearance, servicing,

static firing operations and a post static inspection, and padding suits.

Part of the padding tests repeats most of the functional tests run during the horizontal operations, and generally runs about two days of work. Second set is done on the afternoon or evening preceding a firing, and repeats the highlights of the previous test.

Cleanup is the last check, and takes place about four hours before firing (X hour).

On Time—By now, everybody is on the launchline as adhering to a rigid time schedule and servicing begins. First, rocket is pumped into its test. Then the periodic time is filled. The rocket motor igniter is installed and

ignited. Oxygen gas check, followed by the pressurizing gas. The last operation is not actually completed until after flight firing operations have begun at X minus 15 minutes.

The way the sequence string stuffs up for the first round is described below.

December, 1946 Viking One was assembled and shipped.

January, 1949 Viking One arrived at WSFG—one year later.

Feb. 1, 1949 Rocket was moved to the firing test and avoided. Ground checks, servicing and static firing were attempted, and the rocket was returned to the hangar.

Feb. 25 Rocket again avoided, vertical operations began.

Mar. 7 Static firing attempted. Failed at X-15 sec. because of faulty wiring of nose downstroke plug.

Mar. 8 Static firing attempted. Failed because oxygen vent valves would not close fully, and drained the nitrogen supply. Firing was attempted again with apparently working valves, and before was used to inspect the nitrogen. The last a fire, and the rocket went back to the hangar for repairs.

Mar. 11 Rocket was strengthened for 31 sec. fire burst. Revision of exhaust stress lines. Exhaust stress loaded from between tandem tubes. Rocket was returned to hangar for repair.

Apr. 22 Reached at firing site. Vertical operations showed up during the static system, characterized by rapid oscillations of the rocket engine.

Apr. 28 Second static firing after cluster elimination. Smoke showed and motor was shut down at 24 sec. Smoke was caused to new installation looking on but stress lines, no rocket was cleared for flight.

Apr. 28 Firing scheduled, but cancelled because of weather.

Apr. 28 Firing cancelled because of faulty operation of oxygen vent valves.

May 3 Operations had begun when a wire servo was discovered broken.

May 5 Delayed firing because of faulty oxygen vent valves, but rocket finally got away.

May 10 Delayed firing because of faulty oxygen vent valves, but rocket finally got away.

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Heavy loads of Delta-15000 for installation of Steering Computer.

The Air Force is making extensive tests of the Steering Computer in a Delta-15000. Official Dept. of Defense Photo.

The Collins Steering Computer Flies with the Navy and Air Force

Both the Navy and Air Force have extensive tests under way for determining the place the Collins Steering Computer will have in their program for firing all aircraft with the most modern aids for air navigation and flight control. This equipment greatly simplifies ILS approach flying by comparing, instant by instant, actual interpreted incoming information for the pilot. Data from the aircraft's primary navigation and heading aids, radio compass, gyro and altimeter are fed into the computer, and the computed result is clearly presented on screen pointers.

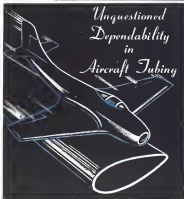
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8	2"	1108	11080	11080
9	2"	1109	11090	11090
10	2"	1110	11100	11100
12	2"	1112	11120	11120
16	2"	1116	11160	11160
20	2"	1120	11200	11200
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on Jan. 9, 1970, and ended—more or less successfully—on Feb. 9. Actually the record was set off from the ground for reasons of range safety—it must have drifted enough for the test and was in danger of landing outside the range limits. Peak altitude was about 50 mi.

Viking Four was the new-hatched record being from the USSR's Norina Sorel, a converted tugboat tender. On May 11, 1970, the rocket carried about half a ton of instruments to a new altitude record for American built rockets—106.4 mi. And the flight also marked the first successful at sea firing of a rocket ship.

Viking Five was fired at White Sands Nov. 21, and scored 107 mi high on a second record-breaking flight.

Viking Six, had it continued to burn out, would have reached to a final height of 135 mi.

►Where To—What's next with Viking?

There are four more being built by Martin and that is the main limit available knowledge on future plans. But the next step could be the building of the V-7 record—not merely to better the mark, but for the sake of the high-altitude data. Then perhaps there could be a steady horizontal flight, or even fixed orbit for distance, instead of altitude.

Whatever it be, though, you haven't heard the last of Viking. Its influence will be felt in future applications of weather, control, long-distance communications, high-altitude physiology and missile design.

Today, the Viking, like its altitude racemates, requires accelerated action to shut them out before they have more knowledge of how to plot their courses.

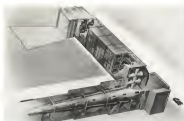
►THEY OPERATE WITH THE HIGH ALTITUDE THERMISTOR READER VIKING 1-2. LEWIS INSTRUMENTS CO., 1000 W. 10TH ST., MINNEAPOLIS, MINN. 55408.

Symposium Looks at Human Body

Two papers concerning the human body as a factor in atmospheric engineering were on the agenda for a symposium presented by the Case Institute of Technology at Cleveland, Dec. 18, 1970.

The symposium was part of a five-day meeting of the American Association for the Advancement of Science.

Speakers listed for the meeting included A. P. Green of the Space Program's office, USAF, who was to present a paper, "The Human Body as a Limiting Factor in Acoustical Engineering," and Walter Gertler, Chief of Psychology Branch, Aero-Medical Laboratory, Wright Patterson AFB, whose contribution was titled, "Psychological Factors in Equatorial Design."



TRUMPET DRIVER for simulated treatment in 5 to 13 cycle range is shown in first phase of NACA Lewis Lab 10-10-70 experiment tunnel sound control facilities



ACCELERATED, EXPOSED solution, initial end, showing its progress and average speed of movement installation. Trumpet driver discharges and is left



DEFUSER discharge end showing location of defuser monitor opening



OUTLET end of progress showing fiberglas panel being reconstructed range from 30 cycles up

New Acoustical Plan Kills Tunnel Noise

Wide frequency range starting at 5 cps. is handled by novel scheme using resonators, fiberglas panels.

Engineers at NACA's Lewis Flight Propulsion Laboratory are using a modified "trumpet" to make the "noise" of an 8 x 6 ft supersonic tunnel.

Visible noise when a trumpet was operated under supersonic speed conditions in the test facility. Wave of each supersonic velocity that oscillates in the air two miles from the tunnel were disturbed, sometimes were reported broken, glass panel loose from walls. And since almost all the testing was done at night because of the power loads, the noise was especially objectionable.

The disturbance was caused by the energy generated by the trumpet 85,000-hp compressor which sent thick waves and enormous quantities of turbulent air pounding against the tunnel walls, and by the noise of combustion from the nozzles.

►Low Frequency—The tunnel noise consisted in a sound output of extremely high intensity down to the 5 to 10 cps. range. Such frequencies produce present waves through the atmosphere that cannot be heard but are of such intensity as to vibrate structures at considerable distances and rattle windows, doors, and dishes.

Conventional types of acoustical treatment do not absorb low level sound frequencies of this intensity, NACA reports, and there was little technical information available about attenuation of low-frequency noise. Special acoustical designs were needed to dissipate the low-level sound starting at 5 cps.

And it was deemed necessary to develop new methods in order to control the wind tunnel noise conditions which were anticipated in the wide range of combustion products that had been planned for the future.

►New Data Used—Under the direction of Massachusetts Institute of Technology scientists, an extensive research program was started at the Lewis laboratory.

In addition to developing inside

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New French Aerobatic Glider

France's proposed Fouga Cyclope aerobatic glider, first flown on Aug. 3, is being put through its paces at the Burgundy flight test center.

This exceptionally fine prototype, the GMRJ-01, is of wood and metal construction and carries a Verbeke turbojet developing a maximum static thrust of 157 lb. and maximum continuous static thrust of 252 lb. A second prototype is under construction at the Airbase-Lesclapier plant.

Except for the push-back jet, the Cyclope bears a general resemblance to the Fouga CM-17A Mustang II, Sept. 15, 1948, but the latter is a carrier craft, with shallow cockpit faired smoothly with fuselage contour.

The French craft's wing mounts jigs and no brakes. End plates on the wing

complement the angle mixer and nose landing wheels.

Span is 25.5 ft., wing area, 105.4 sq. ft., length, 13.9 ft.

Weight of airframe is 623 lb.; engine, 254.2 lb.; fittings and equipment, 58 lb.; fuel and oil, 105.5 lb.; pilot, 182.5 lb. This aircraft gives a total weight of 1222 lb. Wing loading is 11.6 lb./sq. ft.; power loading, 3.47 hp./lb. thrust.

Maximum allowable dive speed is 279 mph, maximum cruise at 13,120 ft., 218 mph. Rate of climb at sea level is 1870 ft./min. Cruise, limited by fuel economy, is 31,200 to 39,000 ft. range at an altitude of 13,120 ft. is 150.5 mi.

Takeoff run is 839 ft., distance to clear 65 ft. obstacle, 1115 ft.

Antisymmetric Span Loading Studied

Swirchback and low aspect ratio have been two handicaps which have inhibited the utilization of certain aerodynamic configurations.

There was a time when one of the most difficult tasks confronting any aeronautical engineer was finding one particular report of many which would contain all the steps of his proposed study laid out for him. Once the report was in his hands, performance data or spanwise loading distributions followed rapidly.

Now, of course, the program is different. Reports just don't exist in advance of the design phase of the advanced art of aerodynamics or if they do, they always seem to apply to a case just beyond, different than the reports can't be used directly.

■ **Backlogged Data**—For the past three years, the National Advisory Committee for Aeronautics has been gleaning, additions to the literature of aerodynamics which account for some of the effects of swirchback and low aspect ratio. NACA's publications have contained mostly open looking, including the effects of roll and twisting.

The latest of these NACA papers is Tech Note 3148, "Theoretical Antisymmetric Span Loading for Wings of Arbitrary Plan Form at Subsonic Speeds," by John DeYoung, Ames Aeronautical Laboratory, Moffett Field, Calif.

DeYoung's paper is generalized to a high degree. It presents charts which determine antisymmetric loading for any arbitrary antisymmetric angle of attack.

The charts are limited only to wings of symmetrical plan form with constant spanwise sweep angle of the quarter chord line. Further, consideration is given to the flexible wing in roll and to the aerodynamic characteristics due to roll damping hysteresis and stability.

■ **Lifting-Surface Unit**—The classic lifting-surface theory becomes inadequate for wings with sweep and low aspect ratio. Consequently, the more complex lifting-surface theories must be used. DeYoung considers a lifting vortex located at the wing quarter-chord line as a simplification of the lifting-surface theory.

Antisymmetric load distributions are obtained by the solution of three simultaneous equations. Coefficients of these equations are presented in parameter charts which account for wing geometry, compressibility and section lift-force

slope. Once the angle of attack distribution is chosen, the loading for an arbitrary antisymmetric angle of attack distribution can be found.

The antisymmetric loading, roll and aileron deflections, the angle of attack distribution on a given and simultaneous equations have to be found. Loading in these cases is then obtained by carrying on the proper equations coefficients corresponding to wing geometry. Mach number and lift-force slope. These coefficients are also presented in chart form.

■ **Roll Characteristics**—Rolling moments due to roll and to aileron deflections can also be obtained from DeYoung's lifting-surface theory by adding to a wing with aileron a known equivalent to the roll wing moment due to aileron deflection, and procedures for determining its value are given.

For the special case of straight-taper wings, load distributions and values of the rolling moment coefficients are given in chart form for a range of wing plan forms.

Validation of the theory, but as presented and theoretical (it is done in the application of the theory) can be made for large antisymmetric angles provided the flow does not become separated.

Compressibility corrections are valid up to some speed, subject to the usual limitations of linearized compressible flow equations.

Swedes Pooling Their Jet Know-How

(McGraw-Hill World News)

Stockholm—Two Swedish engineering companies, STAL and Svenska Flygmotor AB, are pooling resources to develop a new jet engine for the Swedish air force. So far, Swedish jet fighters have been equipped with British designed engines, made at Svenska at the Flygmotor plant in Trollhattan (Aeronautics World Jan. 8).

In the fall of 1948, STAL (Swedish Turbomaskiner AB) (Ljungskilde) established an experimental jet engine (the Skuden) of its own design. The jet is an axial-flow type, with six combustion chambers and a fuel turbine that drives the compressor. While no exact, the engine was given day and night, and no other details were released.

The engine now slated for joint development by STAL and Flygmotor will follow the lines of the Skuden, but with at least 50 percent greater thrust. It is intended for the fighters which are now being designed by SAAB to succeed the J-29.

Process Hardens Stainless Steel

Westinghouse Electric Corp. has announced a new process which increases the hardness of stainless steel by about 100 percent, and at the same time improves other of the useful physical properties.

The process, given the name of Zircalloy, resulted from the follow-up of an uncompleted study of zirconium alloys.

Westinghouse scientists expected to determine the characteristic properties of a batch of cast stainless steel samples from Crane Co. laboratories, and is

the course of these studies, involved some low temperature (-790 deg. F.) superalloys. After finding the results they discovered a strong magnetic effect in one of the samples which had a tendency to show magnetism. When other samples were broken at room temperature, they did not show magnetic effects.

Subsequent tests showed that the temperature above was not a factor—dynamically the nature of magnetic permeability had been caused by a combination of metal plastic deformation and low temperature.

■ **Research Check**—The presence of the magnetic effect suggested that other

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physical properties improvements could be expected by working stainless steel at very low temperatures. Dr. Ziegler of Case Co. (which furnished the original stainless test samples) made tests which confirmed that hardness and yield strength in the austenite adjacent to the fracture, and that the hardness was two to three times increased over the "parent" condition.

Dr. Ziegler and F. H. Bone of Westinghouse began a series of investigative studies, with Westinghouse engineers under their guidance, the effects of rolling and drawing at subnormal temperatures.

Highest hardness and strength values were obtained with specimens rolled at the lowest temperatures. Tensile strength, yield stress and hardness were increased more than with conventional rolling.

The proportional limit (end of the linear portion of the stress-strain diagram) was doubled by the cold-working process. Tensile yield stress and fatigue strength were also increased, each by about half.

Weld Inexpensive—More available than these changes was one which occurred in their performance. Austenitic stainless steels worked by conventional methods show a very low weld resistance when compared with some of the cold-chamber alloys usually used because



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of their resistance to sliding friction wear.

In spite of the usual and normal behavior of stainless steels, one of the tested specimens, which differed slightly in composition from the others, showed more performance equal to or better than that of the best non-austenitic stainless steels. This characteristic did not show up as the other samples to as great a degree, but the possibility exists, says Westinghouse, that these unusual results can be reproduced satisfactorily.

Clothing Protects Rocket Fuel Handlers

Loading liquid rocket propellants is often a well-known task—but the clothing has to be functional, not fashionable.

What he wears has to be able to provide protection against heat gases, concentrated acids or other poisonous materials.

Take safety, for instance. It is used in a rocket fuel, generally with red fuming nitric acid as an oxidizer. The worst property of oxidizers is that they can easily be absorbed through the skin. And so sufficient quantity, it is a very deadly.

So special clothing is a must, because regardless of the handler's ability, accidents can happen.

The Problem—Two years ago, the Clothing Branch of Air Material Command's Aero Medical Lab began work developing special garments intended to go:

- Protection for the entire body
 - Cooling, because the intense of protective clothing gets hot
 - Comfort, because of the harmful effects of poorly-fitting or stiff clothing
- Latest product of INCO's development is a covered and lined specially made of vinyl impregnated Phylon plus hand rubber boots and vinyl coated cotton gloves. The head has a plastic visor for heat and acid vision.

Two methods of air-conditioning have been devised. Most air and water evaporation.

For the future, an accelerated test has been started in a wind tunnel to simulate the protective coverings. Calculating air currents from an expansion turbine of the type used to cool fighter jets. The test prevents toxic fumes from entering the hood and dissolves the acid for a separator.

To the case of water evaporation, an outer shell of cotton fits over the cover and the cotton is saturated with water. A demand for breathing apparatus is provided for the suit.

Currently, engineers favor the water evaporation suit because of its economy and ready comfort.

Two metals for high temperatures

INCONEL

INCONEL "X"

Offering a exceptional hot strength and high corrosion-resistance, these high-nickel alloys solve aircraft "hot-spot" problems.

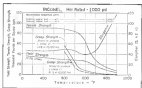
The extremely high temperatures generated within jet and gas-turbine power units are among today's most challenging, extremely engineering problems.

Relatively few materials are able to withstand the destructive combination of high temperatures, corrosive combustion products and high stresses. Still further complicating the problem, many otherwise satisfactory materials are impractical either because of high cost or inherent lack of workability.

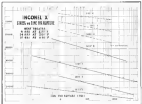
Among the few materials to show satisfactory performance in jet and gas turbine applications are Inconel® and Inconel "X". Both alloys have excellent resistance to corrosion and destructive oxidation at temperatures up to 2000° F. Both alloys are workable. And both alloys are preheated in cost.

Inconel serves best where a high degree of oxidation resistance is required and where moderate hot strength is sufficient. Typical applications are—jet burner liners, exhaust systems, heater combustion chambers.

High-strength Inconel "X" offers much higher hot strength up to 1800° F. in addition to oxidation resistance making it useful for turbine wheels, turbine blades, high-temperature structural members and linings and for springs up to 1000° F.



INCONEL provides an excellent answer to high-temperature metal problems where moderate hot strength is adequate.



INCONEL "X" is a high-strength metal with exceptional mechanical properties as well as high resistance to chemical corrosion.

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EQUIPMENT



DELTA's purchasing team. Left to right are William L. Miller, vicepresident of sales, Wade H. Thibbs, assistant purchasing agent and H. D. Wigley, director of procurement.

Airlines Buying More Equipment

Delta's purchases increase 60 percent in three years; mobilization complications anticipated.

New and larger aircraft, and mobilization of existing fleets to greater capacity, have caused higher aircraft requirements, but also higher equipment and supply costs. With some necessary items sought in the mobilization program, costs are expected to go even higher in 1953.

As compared to Delta Air Lines, with an efficient purchasing procedure and inventory control. Despite this, Delta officials believe expenditures that year will increase substantially over the \$4,585,499 spent in 1950.

► **545 Suppliers**—The 1953 purchases were about 68 percent greater than the \$1,014,445 total in 1949 (Aeronautics Week Aug. 16, 1949). The airline buys from 175 suppliers in Atlanta, its base town, and 370 suppliers elsewhere. And it buys in the neighborhood of \$1,000 stores a year.

Installed in its 1950 purchases were \$1,345,651 for parts and supplies, \$776,574 for engine parts and their repair, \$3,187,853 for aviation fuel and oil, and \$425,130 for food for passengers. Delta spent an equivalent of 678,160 cups of coffee at a cost of \$47,634 alone in its food budget.

The company now has in operation 17 DC-3s, 6 DC-4s and 6 DC-6s for passenger service and 3 DC-3s for cargo. Early in January, it expects to place into passenger service another DC-6, but what additional equipment will be needed to handle the expanded service in traffic has not as yet been decided.

However, it is agreed that parts and tool plus costs will be higher based on higher volume of business and greater utilization of equipment.

► **Inventory Control**—All this means that Delta will maintain even greater control in its purchasing program and needed vehicles and balance its maintaining its inventory.

Delta, as with other air lines, finds that inventory balance and control requires a satisfying procedure. Delta believes that its system of control now covers over 40,000 items, has operated now effectively and efficiently with a

measure of success. There are only seven members of the purchasing department including Mr. Wigley, purchasing agent, and Wade H. Thibbs, his assistant, two buyers, one secretary, one stenographer and one clerk and follow-up clerk.

One factor considered of major importance in the efficiency in the purchasing department is the long tenure of each employee and familiarity with details and procedures.

At present Delta is carrying an inventory of about \$1,705,000, up about 75 percent over 1949 but only slightly higher than a year ago. Items have been made to maintain a 60-day stock of general supplies and a 90-day inventory on other items. While turnover is around twice a year, it has been up to three times a year on a large portion of stock. The high inventory factor has enabled the company to keep value of inventory at a minimum level.

Delta officials believe that operations under the national emergency will change a lot of patterns, especially with so many items being placed on the control list. In the past Delta has worked on many parts in it could be in one maintenance and repair shop. Most of this is likely in the future which may mean expansion of shop space.

► **Supply Difficulties Soon**—While the air lines will operate under the emergency and be assured of needed maintenance requirements, Delta officials feel that there will be greater difficulty in obtaining supplies than was the experience during World War II. This is based on the basis that the Army and the airlines now operating under the same type of equipment. Now the

Joint Purchasing Group

With the country now under a declared national emergency, some airline officials believe strongly that a joint purchasing group and one-stop supplies nationwide is necessary for the industry. This belief which has been held for several years, now is stronger than ever in view of the nationwide emergency and the difficulties of obtaining supplies.

A joint purchasing agency would enable the airline better to balance their maintenance requirements and at the same time allow manufacturers to plan production requirements well in advance. Delta is believed to be a staunch advocate of such an

agency, as its purchasing agent, H. D. Wigley, is chairman of the Purchasing Committee of the Air Transport Assn.

There is considerable opposition to such a proposal, however. Many airline purchasing men feel they can get better delivery by direct contact with manufacturers—especially in a period of shortages—because of firm relationships formed in the past. In addition, these men say the joint agency would involve taking a "middleman" out of the picture, thus increasing the other factors inherent in a national emergency.

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Air Force has advanced to different types of planes, especially jets all of which is increasing manufacturing difficulties.

The added up to the necessity of almost anticipating needs at least an month in advance, although deliveries would be staggered. Manufacturers will be called upon to carry a greater number of stock items and larger inventories of adequate deliveries of supplies are to be assured.

Modernization—in anticipating possible difficulties in delivery of supplies and equipment, together with higher passenger traffic. Delta is modernizing all DC-7s and changing from 21 to 25 passenger capacity. The DC-7s have been increased from 44 to 55 passenger capacity.

The modernization was across phased without reducing high density seating, but by utilizing the cabin space.

Interior of the fuselage was rearranged to accommodate the extra

During 1951 Delta anticipates an increase of about 24 percent in business, based on the present equipment (the first new aircraft DC-6). It further anticipates an increase of 15 percent in utilization of aircraft.

Density 1950 passenger traffic was about 50 percent over the year before. Increases in other phases of traffic were also shown as follows: passenger miles, 40 percent; air mail pounds, 50 percent; air express pounds, 45 percent; and air freight, 52 percent.

Several factors drove much higher traffic to and from the Southwest. The two key airport giant industrialization there is the former Bell bomber plant at nearby Mesa; one to be constructed, Chase Aircraft is to move to Birmingham and the new B-46 project near Augusta, all adding up to more air traffic.

And with this growth, Delta officials say they will be watching even closer their purchases and maintenance of its various control. All of this careful planning is one factor which enabled Delta to show a profit of around \$880,000 for 1950, finishing the record profit (as compared with a deficit of \$412,558 in 1949).

Where Money Went—The following table shows the airline's purchases during 1950:

Boeing 707	100,000
A. (2) 100 (Boeing)	100,000
C. (2) 100 (P & W)	100,000
(2) 100 (P & W)	100,000
20000000 in engine parts	100,000
Aluminum parts	100,000
Aluminum window glass	100,000
Canvas seatcases	100,000
Landing gear	100,000
Aluminum wheels	100,000
Aluminum bolts	100,000
Steel bolts	100,000
Carbon wheels	100,000
Depositor items	100,000



Illustrated are two 8 1/2" bellows used in jet aircraft engines and a 10" bellows suitable for turbochargers.

There is a CMH Stainless Steel Bellows to meet every aircraft requirement

Although CMH manufactures bellows of greater diameter than the larger of the two illustrated above, this photograph conveys the wide size range in which CMH Bellows are available. Whatever the size—1/2" and up—CMH Bellows are precision made to meet the most exacting requirement. Ad-

vanced manufacturing methods permit the forming of most types as standard production items with the obvious advantages of greater uniformity and lower cost.

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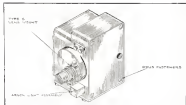
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SKETCH showing configuration of new synchronous camera recently put on the market.

Versatility Feature of New Camera

Flight Research Engineering Corp. producing 35-mm. unit for flight testing, many other applications.

A new 35 mm. synchronous camera capable of maintaining one millionth shutter interval has just been announced by Flight Research Engineering Corp., Richardson, Va.

This latest development, labeled the Model IV 35-mm. Synchronous Me-

chanism Picture Camera, follows the Model III 16 mm. camera which has been used extensively by both Air Force and Naval test facilities in evaluating test equipment according to the manufacturer.

The Model IV unit designed pri-

marily for flight testing, missile tracking, fire control and bomb spotting applications, can take either single-frame or continuous exposures. Additional units, such as stereographic photography and picture control analysis.

The synchronous control mechanism, on which picture are focusing accurately all slitters of camera in a parallel optical path within a maximum divergence of 5 deg. This is equivalent to 1/1000th sec. at a film speed of ten frames per sec. A silver dress capacitor clutch, actuated by a special circuit keeps any one camera from gaining or losing a frame in a sequence.

Any camera in a group can be used as a "master" the others as "slaves." Drawings are made for synchronizing one unit by a single single channel radio link, despite the fact be placed at the same point.

The mounting pads, aligned with the optical axis of the camera, are designed accurately enough to permit in transferring any without disturbing their original alignment.

Versatility.—The Model IV, which the manufacturer believes to be the only 35 mm. synchronous camera on the market is interesting because of its diverse applications to which it may be put, including, for example, aerial photography.

Flight testing.—One or more cameras may be used to photograph objects and engine instruments while others simultaneously record the plane's attitude by photographing the horizon.

Missile tracking.—Path of an aircraft missile may be recorded with an accuracy of one foot in a thousand, Flight Research says.

Two or more units consistently placed and synchronized, permit accurate determination (by triangulation) of missile position as a function of time. The precisely located reference markers permit detection of tracking error at better than one percent and by making measurements on a projected picture.

Airborne fire control system evaluation.—Through evaluation of an airborne fire control system and its operating personnel may be achieved with this setup, several cameras to record synchronously the bomber's horizon (to determine attitude), photograph along the gun's bore, photograph along the director gun and along the flight axis of the "target fighter." In the case, lighter and bomber cameras would be synchronized by radio.

Bomb spotting.—By simultaneously photographing bombs, light and bombing instruments and target area, bombing errors and their cause may be determined says the manufacturer. Tracking or target lights may be used to mark

all films at the exact time of bomb release.

Design features.—Among many features of the Model IV listed by Flight Research are:

Frame speeds of 5, 10 and 20 frames per second. Other speeds such as 4, 8, and 15 can be supplied. Standard exposures are 1/300th, 1/100th and 1/120th sec. at 5, 10 and 20 fps, respectively.

Film chamber capacity is 100 ft. of film rolled on daylight loading spool.

Film cassette is visible from the rear of the camera shows exact number of frames exposed since the camera was last reset.

Temperature and altitude conditions.—Model IV is designed to operate at temperatures from -75 to +75 deg. C., humidity up to 100 percent and to 60,000 ft. altitudes. Thermobaric control prevents the film chamber from getting below 0 deg. C.

Coding and timing lights.—Coding film sequences and indicating time intervals on the film is accomplished by a Gen and Electric amovable 125 light. For marking extremely short intervals in higher exposures, an open loop is provided.

Boreighting tools are provided to enable operator to bore-right the camera at their mounting stands with great accuracy.

Lenses.—Minox will accommodate any lens designed for a Bell & Howell Type C mount.

Power supply.—The 1/100th-sec. synchronous motor used in the Model IV requires 50 watts, draw-plus 115 v., 400 cps. The clutch and heater switch operate on 50w at 230 dc. Coding and timing lamps require 1.5 to 37 dc. Approx. lamp is wired in series with a 15,000-ohm resistor and firm at less than 115v.

Flight Research Engineering Corp. believes that the Model IV camera will serve a useful purpose in the current supersonic program.

O-Rings for Jets

Completion of trials and build-up of service stocks of O rings in all of the 161 new units recently added to Speed action AP-914 has been announced by Parker Appliance Co.

The new additions being in 189 the number of units now covered by the company at AP-914 standard stock items. These O-rings fully comply with the critical fuel-resistant requirements of MIL-B-5515, Parker says. They are made of a special compound especially suited to other static or dynamic service in sealing components in jet fuel systems and auxiliary installations.

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¼", ¾" & 1½" line sizes are QPL equipment
per MIL-V-5523

FLOW CAPACITY DATA (gpm)

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Previously, a tight packing seal could be used to prevent pump leakage, but it also reduced pump life through severe wear on the shaft. Now a mechanical seal, eliminating the both wear packing gland and need of constant adjustment, has been incorporated in the seal.

The mechanical seal is located back of the seal housing and consists of a synthetic rubber gasket housed in a cast aluminum plate. It is held against the shaft by a copper spring. The new one-piece pump has ball bearings at one end of the shaft and a Tapered roller bearing on the other end. Smaller capacity pumps using ball bearings at both ends of the shaft also are available. Address: 1395 SE Morton St., Portland, Ore.



Radio Compass Dials

A line of dual radio compass indicators has been scheduled for introduction early this year by Aviation Accessories, Inc.

The 1½" Wirth company plant to turn out a large unit, AD-50, and a smaller version of this, the AD-52.

LOOK TO Bendix-Pacific FOR ELECTRO- HYDRAULIC EQUIPMENT



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Solenoid Operated Valves—Bendix-Pacific makes many types of solenoid operated valves. Since in the new Bendix-Pacific solenoid operated hydraulic valve system requires the cylinder plate to be open to return in the next operation. The valve operates at speeds up to 1/100 second with the closed valve and without shock and holding ends in position.



Bendix-Pacific Power Units—The Bendix-Pacific Power Unit is a complete, independent power system designed where the work is done. Developed by Bendix-Pacific engineering to meet requirements of large aircraft and other power requirements and control advantages of stability and the power requirements of various types of hydraulic. And developed in the C-100 aircraft, for example, these systems have been used without without change in power transfer, about the engine with introduction.



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SALES & SERVICE



ONE FOOT ON GROUND: A spokesman at Nyng leads first candidate outside to Fulton

Army Interest in Airphibian Seen

The Army could make good use of the Fulton Amphibian, newly certificated reusable plane (Aviation Week Jan 1), according to its designer, Robert Edwin Fulton, Jr. Possible use would be for special forces, transportation of key officers, and other places where combination of air and surface travel may be desirable.

In addition to orders for a dozen Amphibians from India and CAA indications that it might use the reusable craft for travel by its agents, Fulton claims that a Texas dealer says he can sell all the planes Fulton can make.

Reusable plane enthusiasts say the Amphibian is the biggest step in the lightweight field in years. Now as air travel can lead to Amphibians at the airport, detach the car from the flight compartment, and drive the car down the highway at speeds up to 50 mph.

Production Troubled—Material shortages probably will not affect Amphibian production in early entry. Fulton has the tools and dies at his Danbury plant for special parts machining. Fulton is said to be backed by enough money to produce the plane in quantity if the public wants it.

Comparison—Right now, Fulton has the only certificated vehicle that offers combination air and ground travel.

But at least two other advanced type airplanes are looking for certification in the future. The Kopyen-Bollinger Helaphone has no automobile attach-

ment but it has the advantage of extremely short runway requirements and low stall speed, so it can get into small compartments, etc. The Machine Taylor Airplane is reusable and carries its wings with it on the road. These two also are expected to get initial endorsement from CAA, if and when they are certificated.

Pilot-Fulton says his Amphibian will sell for under \$10,000. A lot depends on quantity of orders, on individual prices and availability, and on production technique and labor.

Weak Eyes Do Not Mean Poor Pilots

Pilots with deficient eyesight are put at risk as they face non-perfect airports according to an analysis of pilot records by the Committee on Aviation Psychology of the National Research Council.

Prepared for the Civil Aeronautics Administration, this finding should help private pilots whenever they move planes, it should also permit the military to re-evaluate more on human and psychological stability of pilot applicants, rather than on physical attributes.

The study shows that although sub CAA standard pilots may have more slowly, they have just as good safety records as those who can meet the CAA standards.

The week-end pilot group group analyzed had done the same amount of flying as the good-eye group. This is the first study of its kind in which the accident experience index, important and type of flying done for each group was known. This is probably therefore the first apparently valid analysis of the relation between pilot eyesight and pilot performance.

Most CAA requests of applicants for pilot certificates have been due to bad eyes.

The findings of this report should be useful in altering the manner which has been suggested in some quarters with respect to the CAA policy of granting individuals with defective vision to qualify for the private flight certificate, the authors state.

The study was conducted by David Nelson and I. S. Bantz. Their report is published as No. 94 of the CAA Division of Research. The survey covered the records of 144 pilots divided in three groups: normal vision, vision corrected to normal by glasses, and defective vision not reasonably correctable to normal with glasses.

Many potential private and commercial pilots have failed to get into aviation either because they were rejected or because they thought non-perfect vision was necessary for safe flying.

And the Navy and Air Force have found themselves severely limited in pilot selection because they demanded unusual 20/20 vision.

BRIEFING FOR DEALERS AND DISTRIBUTORS

Titus Expands—Titus Academy of Aeronautics, Oakland, Cal. takes over the nearby 20-year-old Morris Flying Service based on Hangar 2 of Oakland Airport. The deal covered a fleet of eight planes and extensive maintenance equipment. Titus, a division of Transocean Air Lines, recently was awarded a contract by the Republic of Indonesia to train 50 aviation officers.

Private Fields Up—Private-owned airports have increased to 1167, compared with 900 last year, with Texas leading all states (633), California being second with 325 and New York third with 261. National totals show 6445 civil and military fields, according to CAA.

Flight Operations Surveyed—Activities of 137 local base operations at 67 Washington State airports were scrutinized by CAA to study their possible safety hazards, modernization. The operations were found to have 675 planes, 376 pilots, 215 EDA mechanics and 286 other employees.

big changes in the aviation production planning when he says: "Obviously, as the program matures and broadens, coordination will have to be given to further changes."

Right now there are at least three different government agencies planning the role of civil air transport and private flying: an establishment and war. These are the new Defense Production Administration, the NSRB, and the Post Office.

Defense Production Administration was set up by Defense Mobilization Act to "provide coordination and direction to the production phase"

of the defense program. This is headed by William Henry Harrison, former president of International Telephone and Telegraph.

The role of DPA is described by William Harrison, the National Production Authority of the Commerce Department has heretofore had both programming and administration powers over industrial programs and allocations. These powers are now transferred to the Defense Production Administration, but the actual issuance of orders after approval by DPA, etc., will be continued by NPA.

Washington system observers are

NEWS NOTES

EDCO FLOATS SPEED LOUISIANA OIL PRODUCTION

The ability of seaplanes to expedite industrial operations has seldom been demonstrated more conclusively than by the activity which has sprung up around New Orleans and the Delta area. Here a fleet of over 50 seaplanes shuttles daily among the oil wells which have been drilled in isolated bays (country previously reached only over rough country roads or by boat).



Now many different firms serving the oil industry use their planes on Edo floats to make in-creases the same time which used to take a whole day. Engineers, supervisors, service personnel and many others have learned to fly and use company planes in a multi-effect manner of moving the growing importance of civil aviation to the efficient operation of modern business.

Edco's intensive experience in building all-steel floats is now engaged in survey other metal working projects. Typical of this type of personnel manufacturing is the collector shown at the right, made for Raytheon ship-board radar equipment.



EDCO GIDDITIES. Edco's Electronics Division has developed a new high-powered noise equipment for the U. S. Navy which has already been put to use in the Chicago harbor. To make way for construction of a new filtration plant, a 5 mile tunnel must be dug in bed rock beneath an irregular thickness of sand and silt. To locate the top level of the bed rock, Edco noise equipment was used instead of test booms, with quick, accurate results.

Edco

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scored about how low aviation will fare at the hands of the Defense Production Administration. The role of civil aviation will be considered by DPA's Transportation Policy Council, under its chairman, Conrad Field, Jr. Planning of the Commerce Dept. Representing aviation on this committee is CAAI Chairman Delos Ransell.

The DPA Requirements and Allocation Advisory Committee will recommend to Harrison on how much material civil aviation should get.

Meanwhile another group, under NSRB, is also studying the role of civil aviation in coordination. This is the Industry Task Group under the chairmanship of Delos Ransell. It will report to the President and others by May 15 at the earliest. And the aircraft branch of NSRB is preparing recommendations in production allocation.

The Post Office is working on a transportation survey of its own. Among other things, it is studying possibilities of getting a business aircraft system, using a civil aviation plane. But would be competitive with rail in cost as well as service.

The AACC proposal looks more complex than it is. Reopens the AACC plan is more present channels and agencies available. But the idea is to get the Air Force, Navy, Army, Coast Guard agencies on its AACC Chairman, Delos Ransell, under the NPA chairman.

►NPA Electronics Division—Another thing not yet clear is the place of the Electronics Products Division of NPA. This is headed by J. D. Dales, retired New England Telephone Co. man. Under Dales is Donald Paine, who came from Commerce Department and ran an Electronics Products Division.

►Light Metal Division—For verbs, in order for building further manufacturing of some 300 new aircraft aluminum products has been on the desk of retiring director of NPA Light Metal Division. Maj. H. B. Ball, because of the NPA only was expected immediately last week, due to the growing pressure of aluminum shortages.

CCA Air Coach

West Coast intrastate carrier shows low-cost passenger service pays.

By Thomas H. Seik

California Central Airlines—the year in the West Coast air coach problem—has just closed out two years of operation with a total of over 16 million passenger miles flown. To do it, CCA and to back, but not competition. Even the competition of the big operators.

CCA began operations in January 1949. In July 1949, Western Air Lines left at "noncompetition" out of the coast. For a month later, Western Air Lines of California, using planes leased from WAA, and WAA, western, maintenance and facilities, was flying coach operations between Los Angeles and San Francisco.

In April 1950, United Air Lines ended a long period of sitting at "noncompetition" on coach by jumping into the Los Angeles-San Francisco plateau. In the black—Despite this competition and the entry of other scheduled airlines, service in the field, CCA has stayed in the black, except for its first month of operation. In 1950 it flew 91,645 passengers, an increase of 10,578 over 1949.

The increased schedule carrier now operates a total of 28 flights daily between Los Angeles Burbank and San Francisco-Oakland and San Diego, with up to 40 flights on weekends. Call C. C. Sherman, president, says the actual air continues expansion during 1951, offering low-cost scheduled service to California cities now landlocked.

Next station will be Fresno, in the heart of California's rich central valley. Fresno airlines are showing for coach service, Sherman says, and they are anxious about paying \$14 to \$15 to scheduled airlines for a flight to Los Angeles when the same carrier charges only \$10 for the longer San Francisco-Los Angeles run. Sherman expects to save Fresno from Los Angeles in considerably under \$10.

Sherman would like to serve a couple of other busy high-density runs now granted by big airlines, but they involve excessive gate fees and he will have to wait for certification.

California Central has just inaugurated the first low-cost connector service during business hours from Los Angeles International Airport. During the recent holiday season CCA flew 147 passengers in 8 days, from Dec. 11 to Dec. 23. Record day was Dec. 22 with 307.

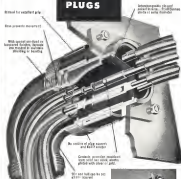
In the last two years Sherman has proved that it is just as profitable to fly a full load at 1-1-100-mile coach fares as it is to fly half a load at double that fare—not to mention the added saving to the public.

►Roosting the Big Bugs—The story of the successful airline carrier is a story of fortitude and foresight. California Central Airlines has been pursued directly or indirectly by the big operators from the time it was in its first flight. But it has weathered the storm and built a steady operation—without subsidies—as well as making the big fellows eat their words on air coach and inevitable to get into the act.

CCA has its main route between Los Angeles (Burbank) and San Fran-

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Schedule keeping and passenger care last are paramount at CCA. The CCA staff looks its best to get passengers off on schedule. Sherman believes it is far more important to get off on time than to land on time. He says pilots get local a plane with a bad start in one month if it isn't in delay, even though the pilot makes it up in flight.

On the other hand, passengers understand if it takes a bit late.

But CCA inevitably makes its landings on schedule, too. Pilots know just where to let down to make the landings. They're highly used to control tower operations. Constant attention is given to improving schedules. Took a two-minute saving in each time is important to CCA. DC-7 time between Burbank and San Francisco is 2 1/2 to 3 1/2 min. and half the flight time is in 1 1/2 to 3 1/2 min. The current DC-4 is on the Kansas route from the coast to its second flight, it is 2 1/2 min for the morning to night.

Equipment operated a night DC-4 is used two DC-4s. All are in line plus in side two streamlines are assigned to the DC-4s and one to the DC-4. Streams are moved on every flight.

The DC-4s are 28-passenger ships with wing doors. CCA gets extra room for seats by eliminating the coat rack and cutting 6 inches off the footrest compartment. Cuts are added and put in the rack over the seats.

Radio Service—Sherman can use CCA's radio system. If a passenger has forgotten some baggage before leaving the airport, CCA's radio will call the line and relay the message. These services may seem unimportant, but Sherman says they build business.

Though, of course, strict schedule keeping is the main booster for CCA.

At present CCA has 794 employees and a respectable headquarters building at Lockheed Air Terminal. The airline has hauled over 175,000 passengers.

In spite of this success in schedule keeping, Sherman is anxious to get the CAA certificate he applied for over two years ago. First, there are the other routes he'd like to service. Also he'd like to get on the other side of the fence to the big carriers with their big carrier at line.

Sherman would also like an opportunity to carry the mail for the cost of the service. He is a firm believer in a situation of mail pay and subsidy in that people get fast mail service but pay only for the service. He believes

services to airlines are paid on a run to "one-hour" basis, but will be paid to big business costs. He thinks any carrier that a qualified should be permitted to carry the mail.

California Central has what is probably the only business-wide issue in the business. Mrs. Edna K. Sherman is secretary treasurer of the company.

ICAO Study Lists Civil Jet Problems

With the application of turbine power to civil aircraft, the design may have to reduce landing speed. Airport layout and approach methods are also in order. These are effects of operational characteristics of turbine-powered civil planes as seen in a study by the Air Navigation Bureau of International Civil Aviation Organization.

Some of the major conclusions by ICAO are:

- **Runway length** may not have to be increased appreciably, at its level. But so far as way has been found to rise down a landing power is added as usually at conventional address.
- **Landing rate** appears to be the most doubtful factor in forecasting runway length requirements of the future. If wing loadings of transport planes are

the same as present types, then full passenger or aircraft rate units would be needed to keep the landing area in bounds. But these are expensive and impractical for airline operations. And revenue jet engines are thought impossible for a long time to come.

That it can be that aircraft designers will have to provide lower wing loadings or special initial steps and slots to allow a slower landing approach than the typical conventional transport of today.

• **Taxi-out** of turbine-powered aircraft at its level may be about the same as comparable conventional craft of today, under standard conditions. This is because they have to fly lighter, and their design performance must allow adequate margins for high altitude performance.

But under adverse conditions of temperature, attainable a plane of 200,000 to 300,000 lb gross weight might need up to 50 percent more runway length than under standard conditions.

The British Council operates well out of a 4,500-ft efficient runway under standard conditions, but it is at altitude a typical condition is a problem.

This might be better to meet critical, however, by use of wing/fuselage retraction. Also, under exceptional low temperature-pressure conditions, aircraft



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might find it convenient to use such a system.

• Fuel consumption in testing is a growing problem with jet. A turbine engine plane of 100,000 lb. burns an amount of jet equivalent to burning one passenger's passenger of 100,000 lb. the distance of two miles just to take off from the field.

They airport will have to provide for faster jet speeds in other areas of the land. Or perhaps military power may have to be applied to the aircraft in some way.

• Fuel requirements are greater on turbine planes, so turbo-propellers may have to be increased, or some hybrid system.

Cockpit Uniformity Standards Issued

Aircraft cockpit standardization plans become a reality when amendments to Part 43 of Civil Air Regulations become effective last week for new plane designs. And cockpit standardization plans for existing airline planes come a step nearer completion with the conclusion last week of the Society of Automotive Engineers Committee 27 meeting which is working with the problem of just what standard should be adopted for the existing Category planes.

By next January all existing transport except the DC-3 and Lockheed Constellation will be standard in set up determined. CAB Chairman Denis Renshaw and Technical Safety Assistant Robert V. Garrett point out CAB will make further regulations that standardize the cockpit of existing planes by one new item and control knob design and color requirements 14 years from now.

Chief reason for uniform cockpit design is the military flight on which airline pilots fly planes of other airlines. Standardization has been in the cards ever since interchange agreements started existing on.

UAL DC-6s to Get Low Tension Ignition

United Air Lines is going to spend \$750,000 equipment to bring fleet of 44 DC-6s with low tension ignition systems (Alexander Weiss, Aug. 7, 1959).

The low tension system, a product of Sylvania Magnetics Div., Bendix Aviation Corp., St. Louis, N. Y., will be installed on 134 Ford and Whitely B-2840 engines. Conversion will start in April, 1960 and should be complete in October, the airline says.

The Bendix-Sylvania ignition system will also be installed on the 29 new DC-8s United will be receiving, starting next month.

SHORTLINES

• **American Airlines—Pittsburgh** C. B. Smith's forecast "has even greater increase in business in 1959" than in 1958. The 1958 passenger mile record of 1,780,185,387 was up 34 percent from the year before. Company total delivery on 14 Douglas DC-8s at cost of \$14,500,000 this year. No new financing will be required. Aircraft load factor 1958 was 70 percent, compared to 68 percent in 1949. Estimated load factor increased 11 percent, to 81 percent, and freight 12 percent.

• **British European Airways—Cayley** Reported employee productivity increased 25 percent in 1958. Rate at which it rose, capacity rose only 10 percent. Oct. 1958 was up 14 percent over 1949 to 36,701,808, number of employees was up 7 percent to 49,017, thus productivity was up 25 percent to 302.4 lbs. per man per hour. B.E.A. claims a profit for the seven months of 756,484 pounds, compared to a loss Apr.-Oct. 1949, of 162,428 pounds.

• **Canadian Pacific Airlines—Carter** says weather had nothing to do with the recent fall DC-3 crash in the Canadian Rockies. Actual cause is still unknown.

• **Capital Airlines—Company's** operating profit in November was \$48,155 and net profit \$26,561 on an operating revenue of \$2,612,501. Expected load factor will be 70 percent, compared to 68 percent in 1949. Estimated load factor increased 11 percent, to 81 percent, and freight 12 percent.

• **Delta Air Lines—Company's** operating profit in 1958 was \$1,166,660 or 52.34 a share, operating profit \$2,190,000. Passenger revenue increased 32 percent, revenue miles 33 percent, and freight 24 percent, against 43 percent and freight 65 percent over the previous year.

• **KLM Royal Dutch Airlines—Company** has a new air agreement with Alaska Airlines. Traveler gets everything, one way or less and after by air. The traveler is permitted to ship his heavy luggage and baggage both ways on his combination ticket.

• **Pan American World Airways—Carter** is operating three prototypes a week on its newly opened Pan-Am service, and extension of the New York-Panama service, against Dec. 17, 1959. New York-Panama line, says, operates from the latest record of 5582. Shortlines' latest record has been cut to 47 percent. Estimated 1958 traffic of Pan-Am routes is 14,122,000 passenger miles. Carter's

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1950 records include over one million passengers and 184 million cargo pounds handled on military runs, while military mail operations by Pacific carried 17,424 tons and 4,074,763 pounds cargo to Korea.

► **Robert Airlines-Texas** airline has an agreement with National Air Transport Services, large irregular routes to acquire the latter's routes. Robert plans to cross 2 million class of stock to holders of National. Robert would then have 9 Commanders, 1 DC-4 and 1 DC-3. Captain has awarded a CAR case and denied other turbulences, certain alleged violations of certified authority.

► **Robinson Airlines-Frederic** has short-term order from CAB setting temporary rate at 75 cents a mile, after all scheduled routes flown during the month in the disrupted route flown during the month. Rate is effective Sept. 1, 1950. But, sign the Board in a footnote, that should not be construed as an indication that Robinson's certificate will or will not be renewed after expiration June 28 of this year.

► **Solomon Island Airlines-Company** says it ordered on Dec. 18 two more Convair Learners to bring its Convair fleet of eight (all operating in Europe). But Consolidated Voice says no such order has been placed, or at least not placed.

► **Seaboard & Western Airlines-Investor** national says owner has leased a one-story warehouse of 1980 sq ft at 155-57 Atlantic St., New York, and has switched freight receiving there from its former location.

► **Slick Airways-Cargo carrier** gave Chevrolet bonus of 5 percent to employees of over two years' service, less for later employees. Company handled over 5 million ton sales freight in November.

► **Town-Canada Air Lines-Company** carried 838,100 passengers in 1950, an increase of 19 percent. Cargo tonnage totaled 4,500,000. The Canadian airline continued carriage of first-class mail because only shakedown package this volume was up to over 4 million tons. Town-Canada flew 98 percent of its scheduled mileage in the past year at network of 17,000 miles.

► **Town World Airlines-Carter's** new de luxe "Ambassador" flights to London and Paris carry a package of \$18, which brings business of limited passenger capacity, full-course dinner, cocktails and champagne.

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What Is Skill?

I was particularly interested in your article on shortage of aircraft labor in your Feb. 23 issue.

May I make a personal experience? If this is so, you may receive letters from others who have had similar experiences. The usual airport where I have been manager the past four years is closing. So with aircraft manufacturing being completely stopped, I decided to take stock of my aviation background, what we work where I might be at arrival.

I am 36, married, in good health, reasonably discharged from USMC reserves, born AAE license, 30 years in all phases of aviation mechanics, ie, aircraft, hydroplan, rigging, assembling, maintenance, electric, trouble-shooting, shop and line experience on piston engines, 400 hp, 1400-horsepower to Consolidated B-24s. Received flight training after leaving service and as line and mechanic years 1950-54. Have completed engine-engine, land and multi-engine, land, flight instructor, instrument, radio operator ground and air flight instructor, all valid CAA and FCC ratings, as well as having completed an airport.

Amused with that I thought rarely someone could see a man with three qualifications.

The widely requested aircraft technicians are quite some distance from this wilderness area so I decided to wait to those areas and others, spent and others.

My mother from those that arrived was in the effort. "Be out there, apply this law and we will let you know if there is a place where we can use you." To date I have heard nothing from them. One seemed to be a misanthropic person, to wit, my "experience did not meet our demands" failed.

I applied for any type of flying or aircraft job that I was qualified to do, provided the license.

Thus a friend of mine (only he was years' aircraft experience, 14 years' flight) is a veteran of aerial aviation, and said he was too old and said his own education and I decided to pay a personal call on those facilities in central U.S. Taking time all that time we made a 1000-mile flying tour in a Stearman Voyager and contacted most of the facilities.

We sought employment through their regular agencies. The last job offered was \$12.25 per hour, annual salary and the would not even take the AAE license. I was turned down once because "with my experience they did not think I was able to do the job they had in mind." I was again turned to go out down to the next one. I wanted, other than flying, but was not being familiar with the infrastructure of the position, I could not make a type of job where they could see me. I was only offered another trial to go on down on salary, and my answer: "the customary way that work" was not satisfactory (after all, I was not sure what they thought

you called for and though I did not expect to get rich, neither did I intend to give my experience away), and again told me there would never be a chance of flying there, that he had more my flying time and couldn't lend, so there, he won't going to let any one get ahead of him, and, his other job opening was to "look" with salary \$1.00 per hour, I was told there were no openings, as my qualifications such as flight time or one of the old time engineers had those did not have, and there was a law waiting for my vacation.

So we came home, somewhat dejected, not knowing just what the future would hold "skill" or "experience." We also wondered if the factory engineers knew that much. We felt sure that someone could use the experience to its full extent. We felt we were not out at all in accepting a job and pay that was in line with our experience and qualifications. There is considerable time, work, and study involved in getting things wrong. Try it some time while this holding a full time job and keep a happy home life. (I married).

I was told further that there are literally thousands of untrained mechanics in the country who have had to pay and live years of education and experience who would be available for factory work if called on and a job and pay offered commensurate with their ability.

So in connection with your article I ask you, in the meantime, what goes?

Here at home my friend is at present working as a carpenter in a job for which he was qualified at \$1.50 an hour. Thank I'll join him.

PAUL MORROW
Box 8400
Washington, Iowa

Ski Prescription

In response to Industry Observer column Dec. 4, regarding Canadian efforts to improve ski, suggest using Washington State as an example in several fields: design, construction and education. Since winter sports are the future, results should be satisfactory.

JOSEPH A. BARTON, JR.
Washington Electric Corp.
Lanette G. Taylor, Inc.
Seattle, W. A.

What Plesman Meant

Your editorial "Why Buses at Air Force?" quoted the speech our president, Dr. A. Plesman, made at the IATA meeting in San Francisco.

You paid special attention to his remarks concerning air freight, and concluded wrongly that Dr. Plesman was inclined to express his height or average thought of air freight. He was not inclined to pay full attention to its development.

Your conclusion seems to be based on his remark: "I am also of the opinion that some attention must be paid to the development of air freight transportation."

Dr. Plesman meant, however, to say that he was concerned that IATA attention must be paid to this very important branch of air transport.

To avoid unpleasant misunderstandings, we thought it advisable to bring this to your knowledge.

R. J. VORNA, Manager
Public Relations Dept.
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Real Growth

This is in regard to your article, "San Francisco's Best Computer Airport" (Oct. 21).

The 14 airlines regularly serving San Francisco are really only 13 since Real took over Nord Airline more than a year ago. There is no such thing as "Real Airlines" anymore since all their airplanes are flying under Real's flag and color. The same thing goes for Management, Operations and Maintenance.

This brings some significant changes to the January-February 1979 issues of Computer Airport. Real took the lot of flights, passengers, revenue, baggage and mail.

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ERIC KATZMAN, MD, ALVARADO, Director of Maintenance
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San Pablo, Calif.

From Airborne Lab

Amazon Web with its article on "GED - Its Error, Computer Reliability" has just arrived.

We are pleased with the detailed presentation of the technical material and congratulate Mr. Anderson on the manner in which he has so effectively handled it. The members of the Laboratory Staff who participated in the project completed a thorough and professional task and we feel personally proud of them.

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